

Work Order ID 83701

83701

Page 1

May 30/12 7:42:55 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-241	F								
100 *100* DC Document Control	DOCUMENT CONTROL Memo Photocopy bluefile & type labels per PPPD350-748-201	0.00 0.00			CHG002			1	12-06-25
110 *110* CNC Bend 2 CNC Alpha 160 Bender	BENDING MACHINE - CROSSTUBES Memo Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT	0.00 0.00						JW/DP	12-5-9
120 *120* QC Quality Control	QC15- Crosstube Dimensional Check Memo	0.00 0.00							12-5-9

Punch. issue R10 to metcar P/O 16942

CZ 12/06/04

Work Order ID 83701

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April-23-12 4:01:17 PM

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Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

125

HandFXtube

Hand Finishing Crosstubes

Memo

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp:

Start time:

Finish time:

0.00

0.00

all pg

1

127

QC5- Inspect part completeness to step on W/O

0.00

0.00

12.05.16

127

QC

Quality Control

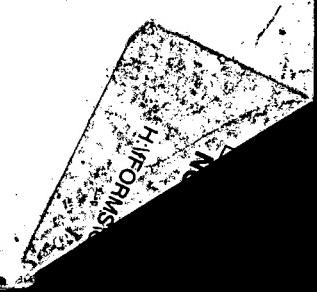
Memo

12.05.16

12.05.15

QP

QP



W/O:

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701

April-23-12 4:01:17 PM

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Page 3

Item ID: D350-748-201

Accept

N900040100

Setup

Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012 **Start Qty:** 1.00 *1*

Required Date: 07/05/2012 **Req'd Qty:** 1.00 *1*

Cust Item ID:

Customer:

Reference:

Approvals: **Process Plan:** _____ **Date:** _____

Tooling: _____ **Date:** _____

Run **Start** *NR1*

QC: _____ **Date:** _____

SPC (Y/N): _____ **Date:** _____

Stop *NR2*

**Sequence ID/
Work Center ID**

**Operation
Description**

**Set Up/
Run Hours**

Tool ID

Tool #

**Plan
Code**

**Accept
Qty**

**Reject
Qty**

**Reject
Number**

**Insp.
Stamp**

130

130

Crosstubes

Crosstubes

0.00

Memo

0.00

I-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube

Batch: _____

140

140

QC

Quality Control

QC6- Inspect dimensions to drawing

0.00

Memo

0.00

8/24/30

MO/RM 12-5-16

JW 12-5-16

HIFORMS

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A,	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701

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May-30-12 7:42:55 AM

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Revision ID:

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Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

150

150

Outsource3

Outsource process - Cad plate

Outsource process-Cadplate per QSI017 4.1.9.1

0.00

CL 12/06/10 4 (1)

Memo

17084

0.00

Issue P/O:

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

Ensure Certificate of Conformity is attached

160

160

Packaging

Packaging

Receive & Inspect for Damage & Mat'l Certs

0.00

RJH/10/10
Kmf/10/10

★ SEE W/D CHG ATTACHED

170

170

QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

CL 12/06/10 X 1

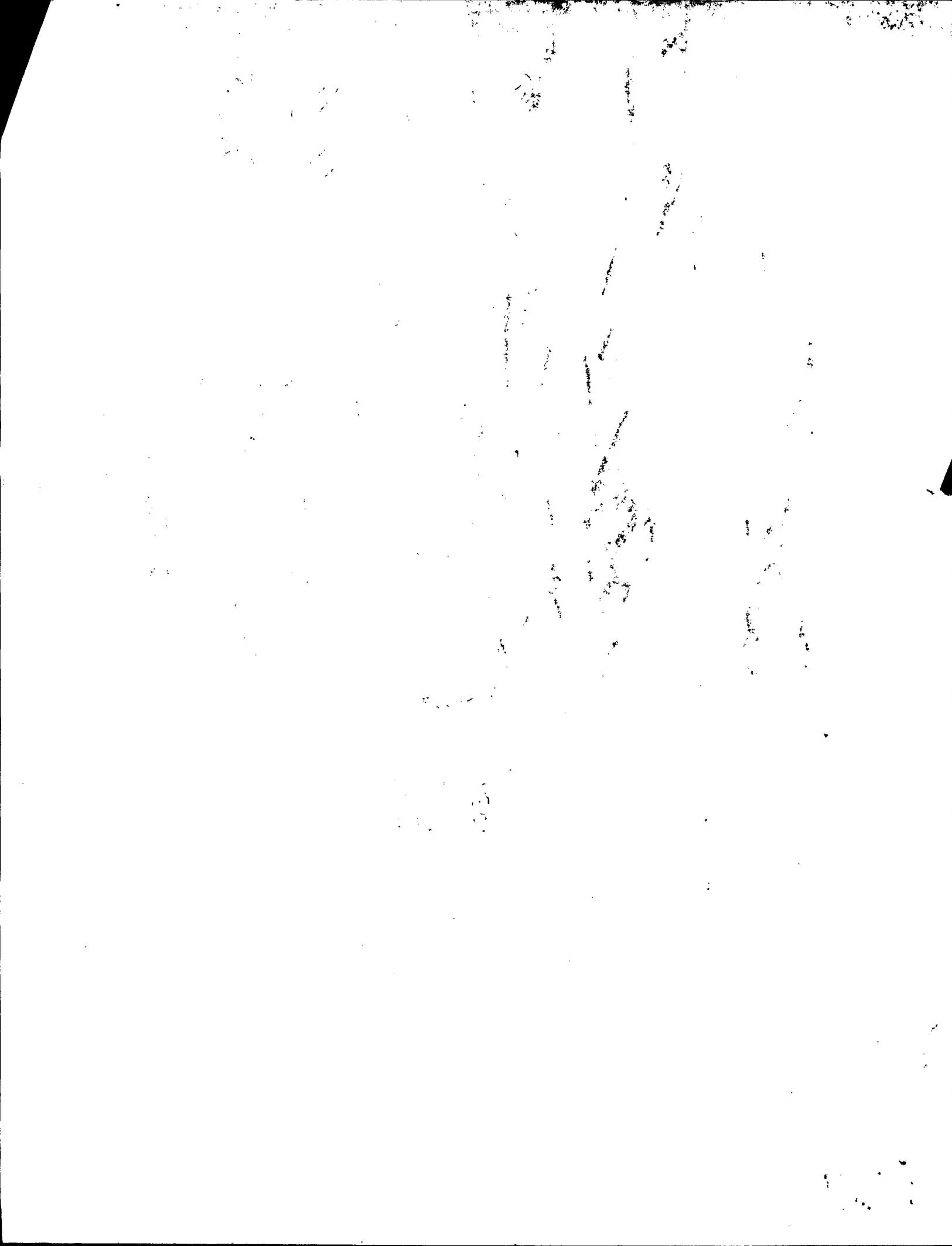
Memo

0.00

P/O:17258

NDT

need



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.13	161	LOAD TUBE TO 3000 ^{lb} FOR 1 MINUTE REF D.S. EMAIL		CP 12/6/13	1	P 12/6/13	
11.10.13	162	NDT TUBE					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

W/O:		WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE			By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701

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May-30-12 7:42:55 AM

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Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00

Q B 12/06/25

210

QC

Quality Control

220

Pick Kit

0.00

12/6/25

220

Packaging

Packaging

Memo

0.00

230

QC4- 100% Inspect kits for completeness

0.00

1 M 12/06/25

230

QC

Quality Control

Memo

0.00

Work Order ID 83701

83701

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May-30-12 7:42:55 AM

Item ID: D350-748-201

Accept

N900040100

Setup

Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

240

240

Packaging

Packaging

0.00

Packaging

Memo

0.00

Identify and pack for shipping as per PPPD350-748-201

Location:

PPP Rev:

b6288

250

250

QC

Quality Control

QC21- Final Inspection - Work Order Release

0.00

Memo

0.00

MW 12/06/26

MW 12/06/26

Picklist Print

May-30-12 7:42:54 AM

Page 1

Work Order ID: 83701

Parent Item: D350-748-201

Start Date: 4/23/12

Required Date: 5/07/12

Parent Item Name: Crosstube Installation, High Aft

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM

IPP Rev: B Update qty of MS21042L5 06-09-12 KJ

IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD

IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC

IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F 10.08.04 added QSI010

4.3 DD verf:EC

IPP REV:G ADD UNDER BEND COMMENT 12-05-28 JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
ALS4-1032-225 Insert		Purchased	No	[REDACTED]		200	Each	819.0000	1	1			
							<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>				
							ST281	796					
							108696	146					
							110768	62					
							118386	55					
							118966	68					
							121269	465					
							ST282	23					
							120410	10					
							120451	13					
AN4-41A Bolt		Purchased	No			220	Each	539.0000	8				
							<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>				
							360	181					
							121185	181					
							ST360	358					
							115108	3					
							115705	7					
							118451	29					
							118838	50					
							119328	100					
							120423	150					
							121205	15					
							121573	4					

Picklist Print

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May-30-12 7:42:54 AM

Work Order ID: 83701

Parent Item: D350-748-201

Start Date: 4/23/12

Required Date: 5/07/12

Parent Item Name: Crosstube Installation, High Aft

Start Qty: 1.00

Required Qty: 1.00

AN4-6A
Bolt

Purchased No 220 Each 1,514.0000 16 16

Location	Loc Qty	Loc Code
355	222	
121631	222	
ST356	1292	
119017	792	16
T21243	500	

AN5-32A
Bolt

Purchased No 220 Each 245.0000 4 4

Location	Loc Qty	Loc Code
ST339	145	
119862	50	
120423	75	
120910	20	

AN960JD10
Washer

NAS1149D0363J Purchased No 200 Each 0.0000 1 1

12-06-24

AN960JD416
Washer

NAS1149D0463J Purchased No 220 Each 30.0000 32 32

12-01-9120

AN960JD516
Washer

NAS1149D0563J Purchased No 220 Each 0.0000 8 8

M119546

Picklist Print

Page 3

May-30-12 7:42:54 AM

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured

No

200

f

242.5445

1.181

1.2431579

W 12 26 24

Abrasion Strip

1-cut as per dwg D2856

Location Loc Qty Loc Code

ST403 216

81875 216

ST409 26.5445

63735 0.6696

68076 0.3149

71164 8.46

79551 17.1

D3500-1

Saddle

Manufactured

No

220

Each

75.0000

4

4

Location Loc Qty Loc Code

ST423 14

78595 14

ST424 31

73405 20

73406 8

76000 3

ST425 30

76940 30

D3501-1

Bushing

Manufactured

No

220

Each

367.0000

16

16

B 85414

Location Loc Qty Loc Code

ST051 367

67757 4

73391 6

74866 207

77033 61

81955 26

83253 63

Picklist Print

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May-30-12 7:42:54 AM

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D3502-1
Support

Manufactured No

200 Each 21.0000

2 2

12-5-24

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST051	21	
	11	
	10	

D350-748-241TRN
Crosstube Turning Detail

Manufactured No

110 Each 2.0000

1 1

12-5-9

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG	2	
61314	0	
61315	0	
79395	1	
82287	1	

MS21042L4
Nut

Purchased No

220 Each 4,059.0000

24 24

12-5-9

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST300	4059	
119075	125	
121011	677	
121444	2957	
121652	300	

MS21042L5
Nut

Purchased No

220 Each 1,447.0000

4 4

12-6-25

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
300	500	
121652	500	
ST300	947	
108827	8	
116105	5	
116548	43	
117611	18	
119109	865	
17651	8	

Picklist Print

May-30-12 7:42:55 AM

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Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

MS21920-20

Purchased

No

200

Each

86.0000

2

2

W

12-624

Clamp (per MIL-DTL-8783C)

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG050	86	
116799	8	
120676	8	
121067	20	(7)
121274	50	

MS27039-1-10

Purchased

No

200

Each

126.0000

1

1

W 12-0624

Screw

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
GA	100	
120449	100	
ST291	26	
120120	26	

DART AEROSPACE LTD	Work Order:	8370J
Description: Crosstube High Aft (AS350/355)	Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev:	<i>FFG</i>

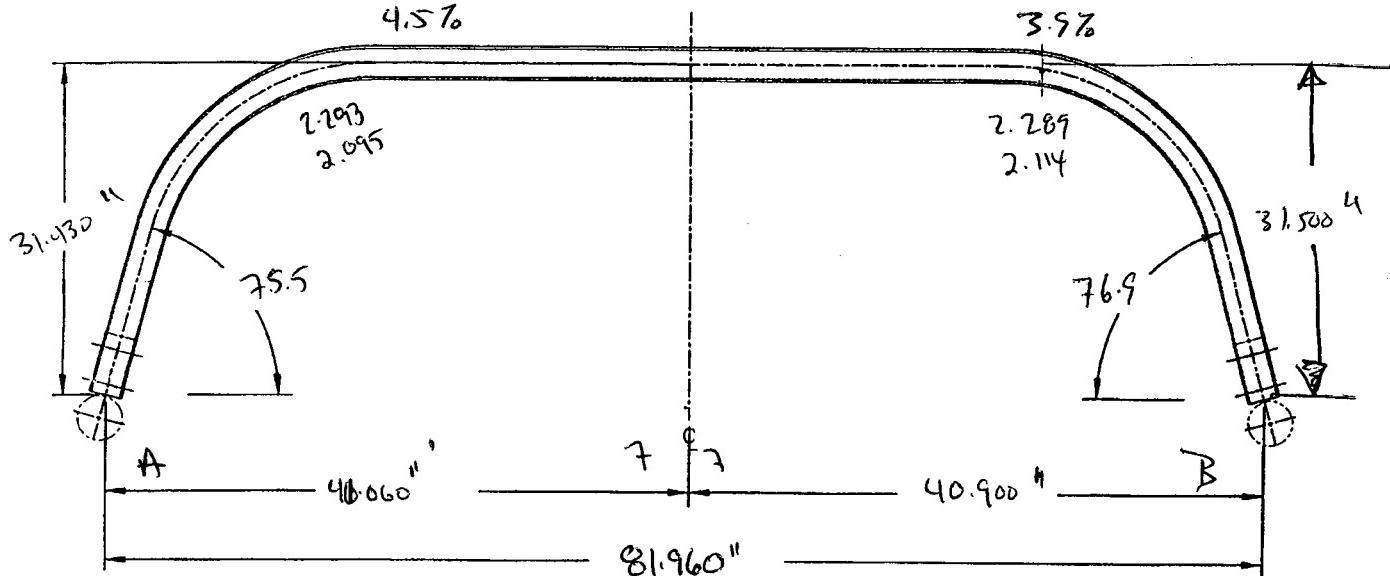
Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06

$0.198 \div 4.388$

4.5%

$0.175 \div 4.403$

3.9%



Comments
Size A = 4.5% crush fit 0 7 passes
Size B = 3.9% crush fit 0 7 passes
twist = 0.194
tube is junked

QC15 Inspection	<i>S</i>
Date	<i>11/08/24</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	<i>JF</i>
B	10.08.23	Dwg Rev updated	KJ	

W/O:

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

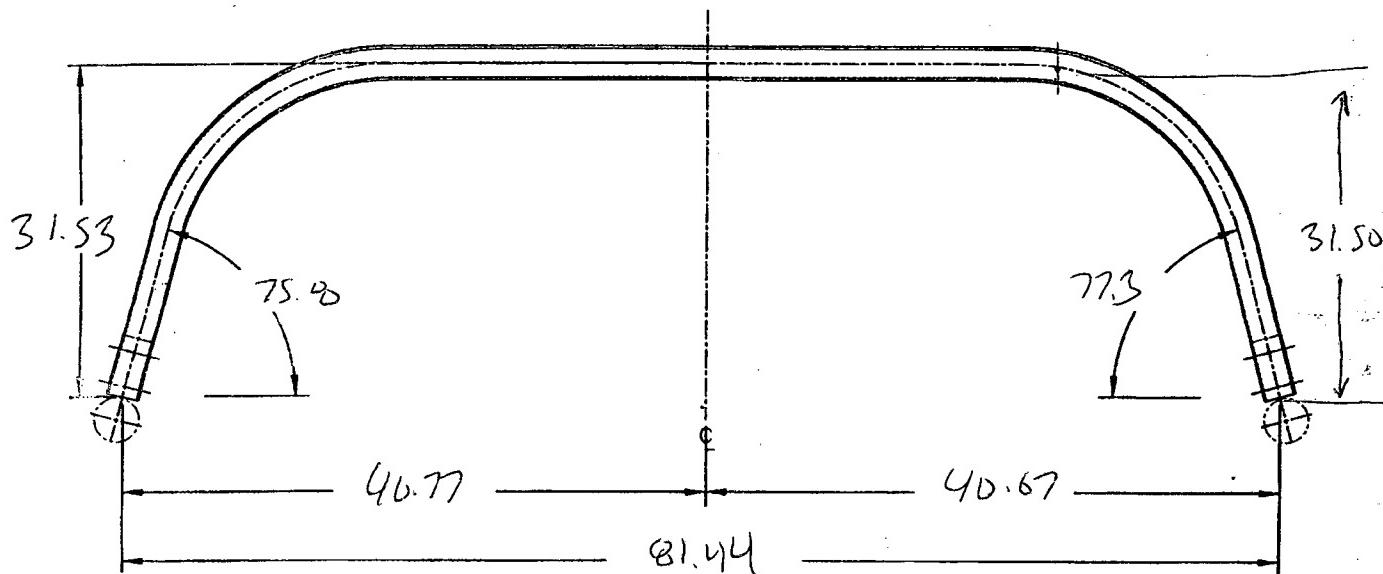
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	B/N 83701
Description: Crosstube High Aft (AS350/355)	Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1

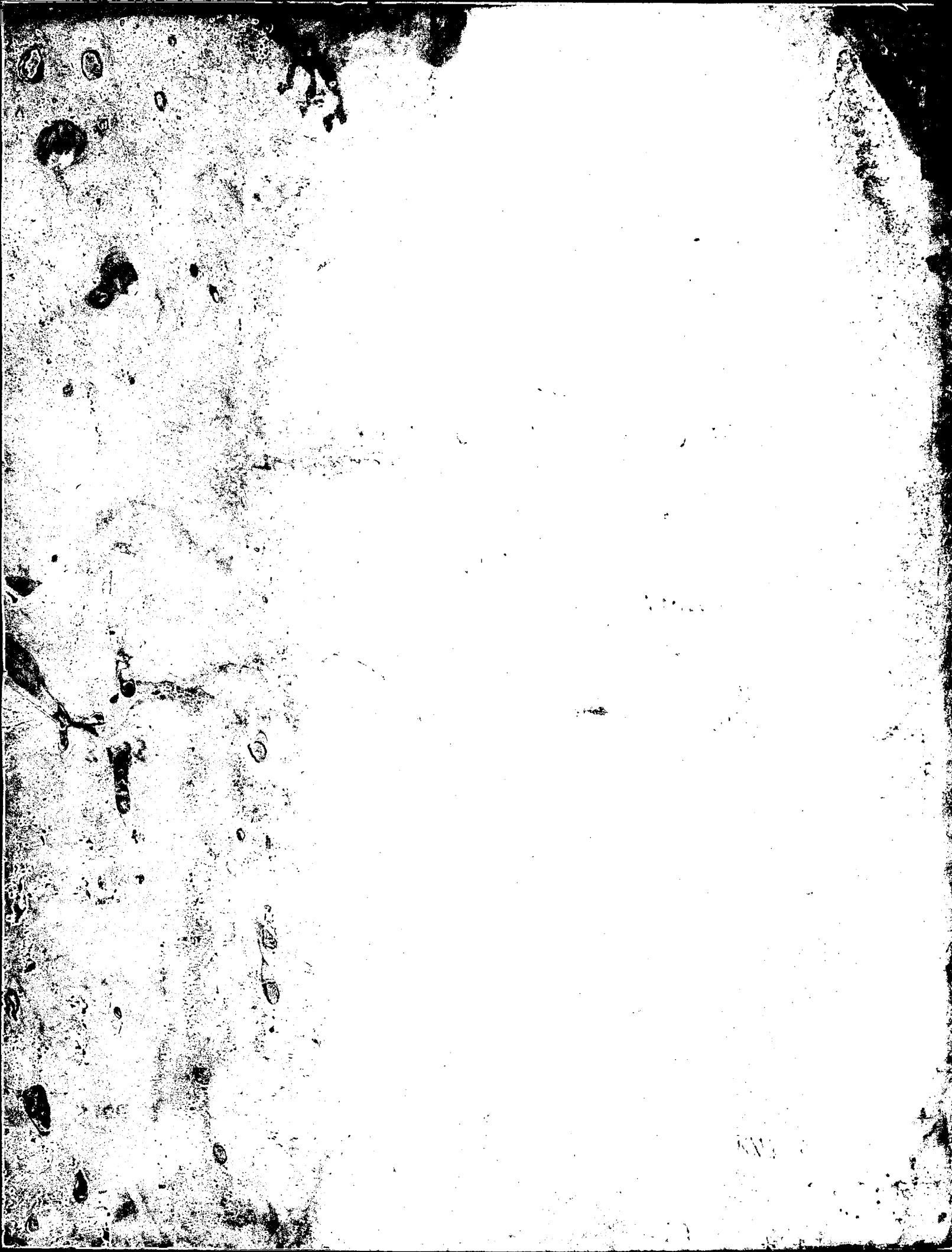
Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist = 0.060
Bent high & narrow - Acceptable CP 12.05.16 QSI042

QC15 Inspection	Date
CP	12.05.16

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	JP



111-149

111-148

111-148

111-147

111-148

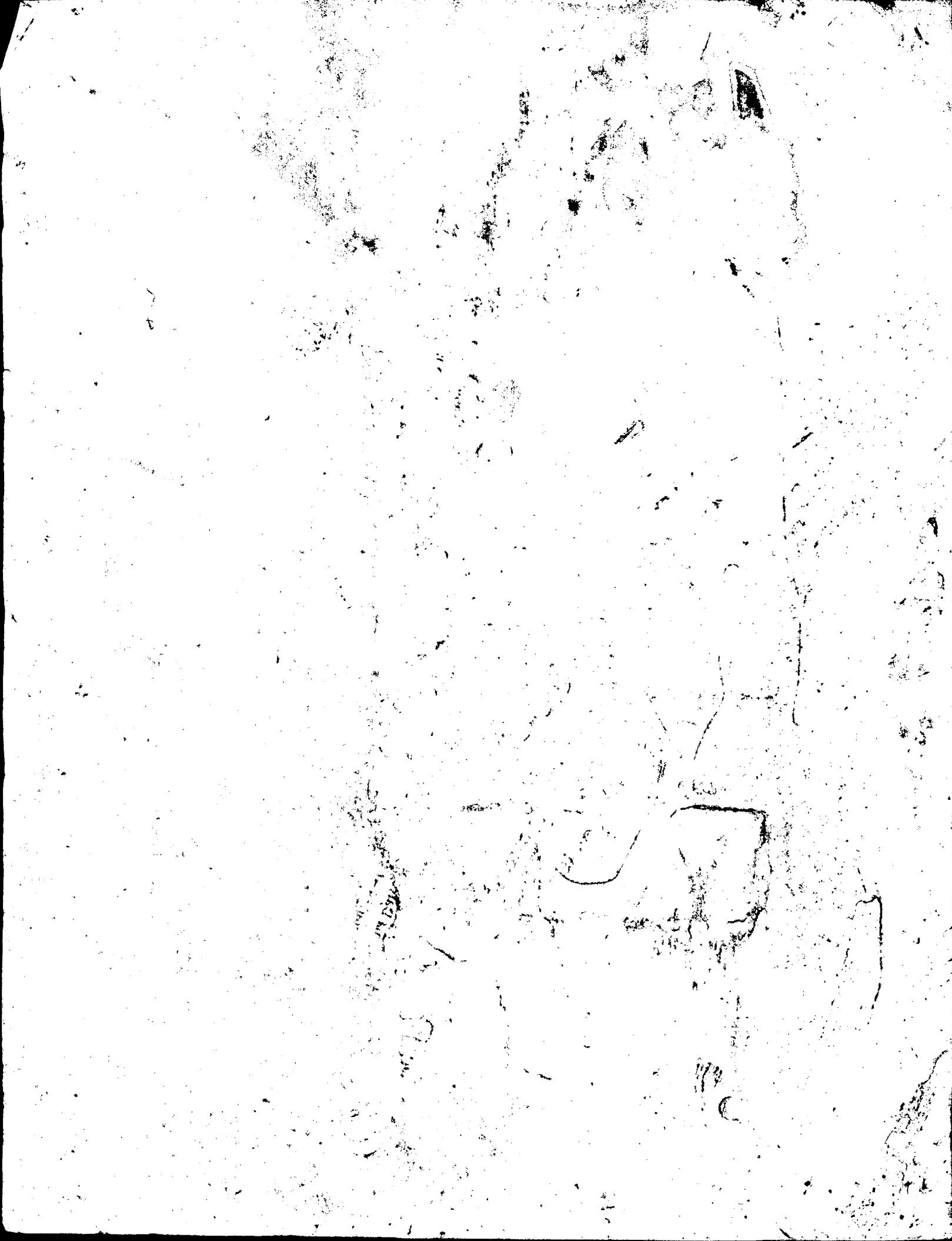
111-148 S10E

111

111

10788 - O/M

0350-248-201



Item	Qty	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- F 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- F 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

83701 MLJ
12/04/24

RELEASED
2011-01-01

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D7-1)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 09-040 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	9P	DART AEROSPACE LTD	
DRAWN	9P	HAWKESBURY, ONTARIO, CANADA	
CHECKED	1	DRAWING NO.	REV. F
MFG APPR.	P	D350-748-241	SHEET 1 OF 4
APPROVED	1	TITLE	SCALE
DE APPR.	1	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT CONTAINS TRADE SECRET INFORMATION OWNED BY DART AEROSPACE LTD. IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

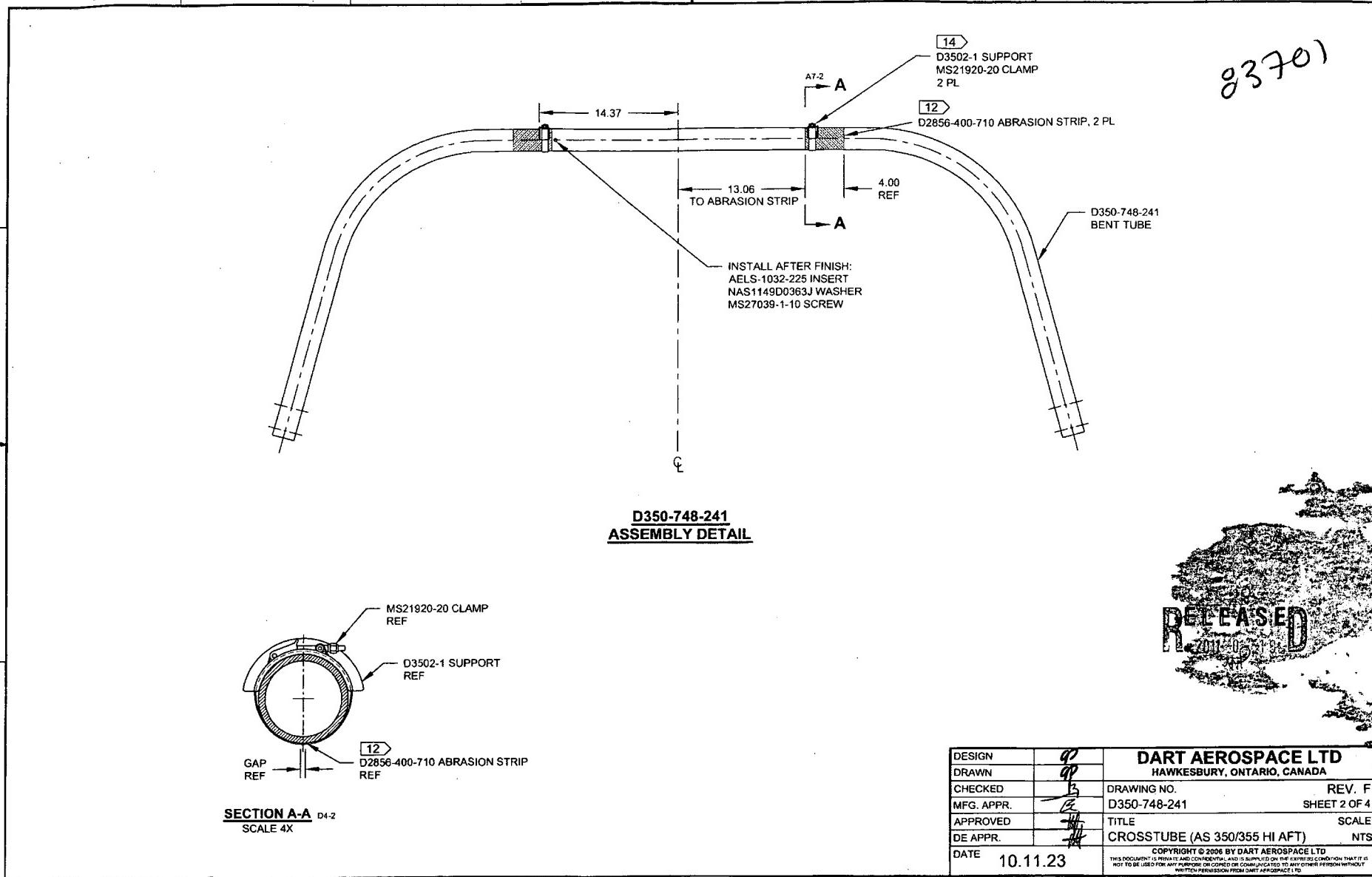
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



DESIGN	<i>g</i>	DART AEROSPACE LTD	
DRAWN	<i>g</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>b</i>	DRAWING NO.	REV. F
MFG. APPR.	<i>g</i>	D350-748-241	SHEET 2 OF 4
APPROVED	<i>g</i>	TITLE	SCALE
DE APPR.	<i>g</i>	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	COPRIGHT © 2004 BY DART AEROSPACE LTD. THIS DOCUMENT IS THE PROPERTY OF DART AEROSPACE LTD. IT IS TO BE USED FOR THE SPECIFIED PURPOSE ONLY AND IS NOT TO BE COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

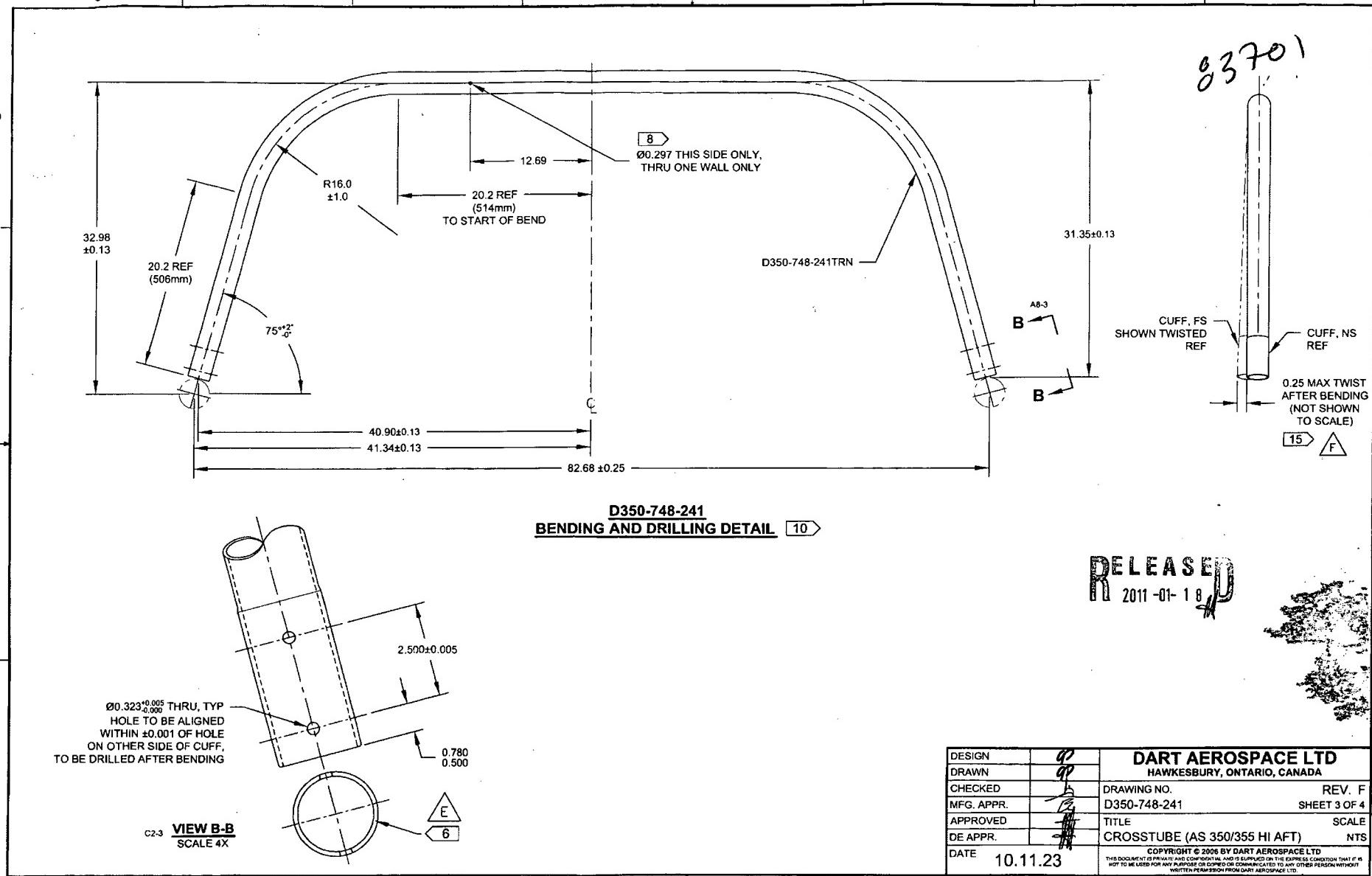
W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

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NOTE: Date & initial all entries



W/O:

WORK ORDER CHANGES

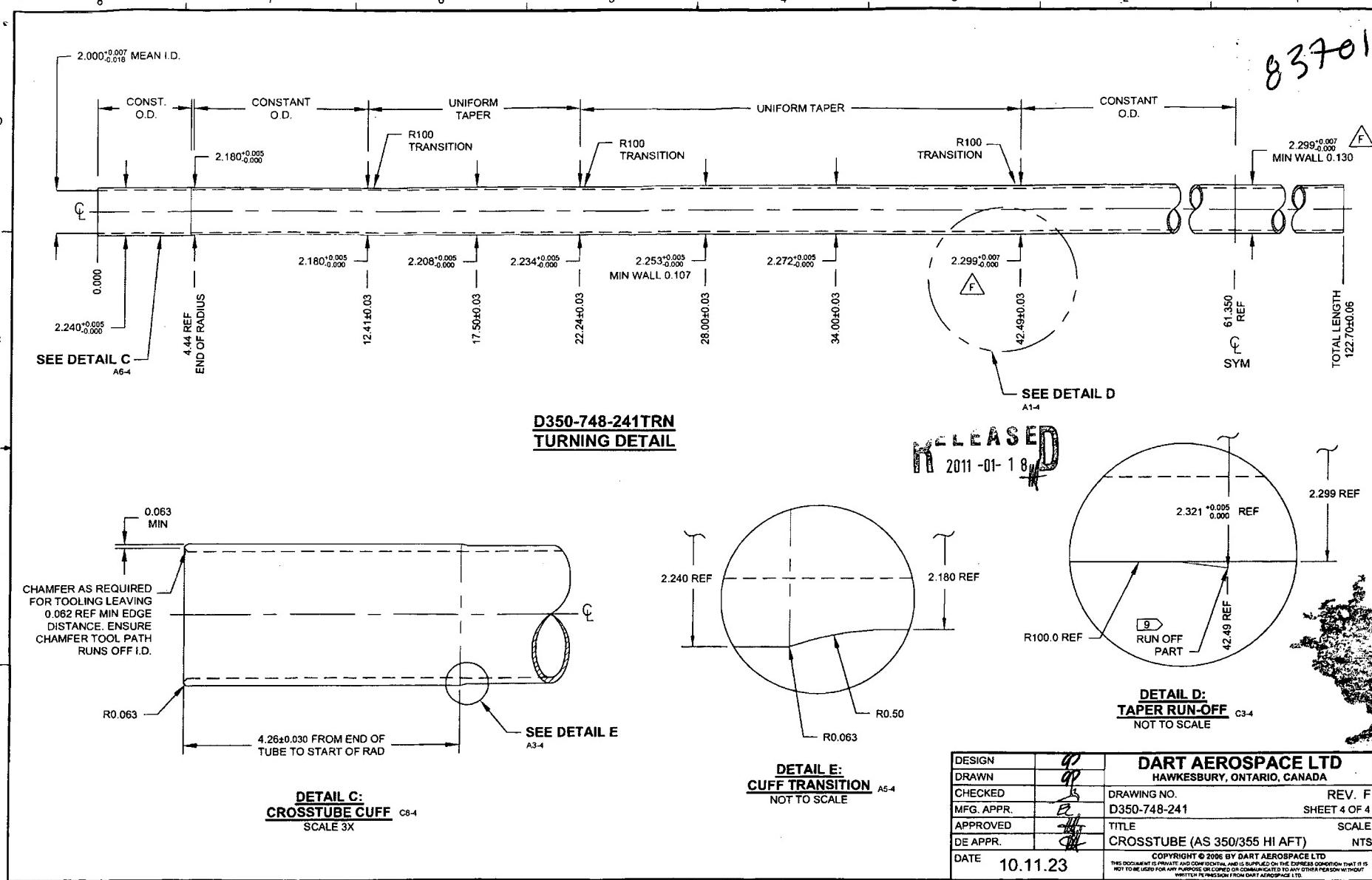
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WORK ORDER CHANGES

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ

ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détailé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16942		Steel		

SPÉCIFICATIONS DU PROCÉDÉ processing specifications

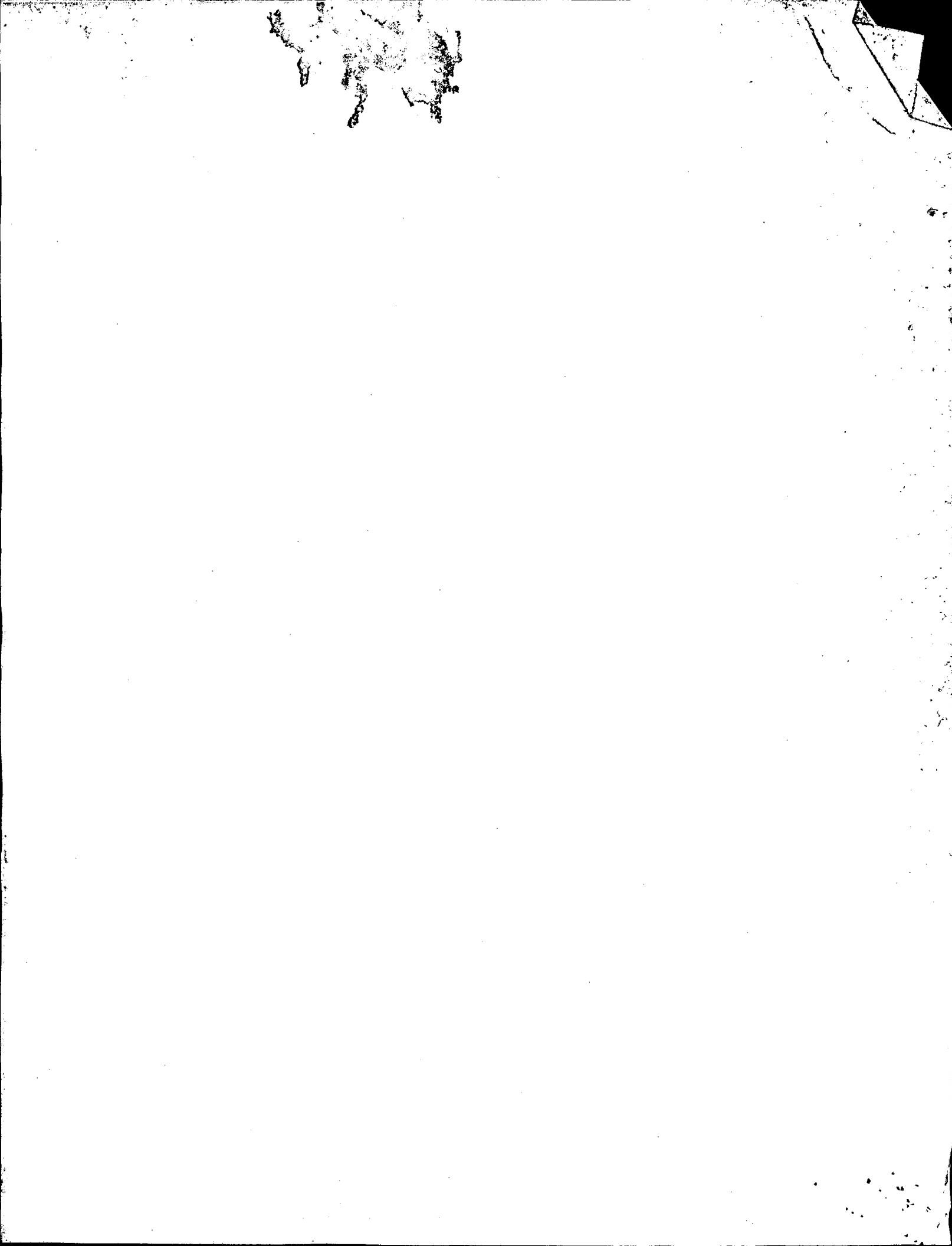
STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement	SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual		

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	<p>D350-748-101 (1) CROSSTUBE</p> <p>(1) D350-748-101 CROSSTUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>CONTENANT: 1 PALETTE</p>

Operation	Temp. spécifiée Specified Temp	Temps de temps Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							



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 1270 ABERDEEN
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ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifiée Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2,00 PREPARATION	COMPTAGE									
3,00 STRESS RELIEF	650	2 hrs 30 minutes	air			701				
4,00 FINAL INSPECTION							05-11-2012			05-11-2012

COMMENTAIRES / comments

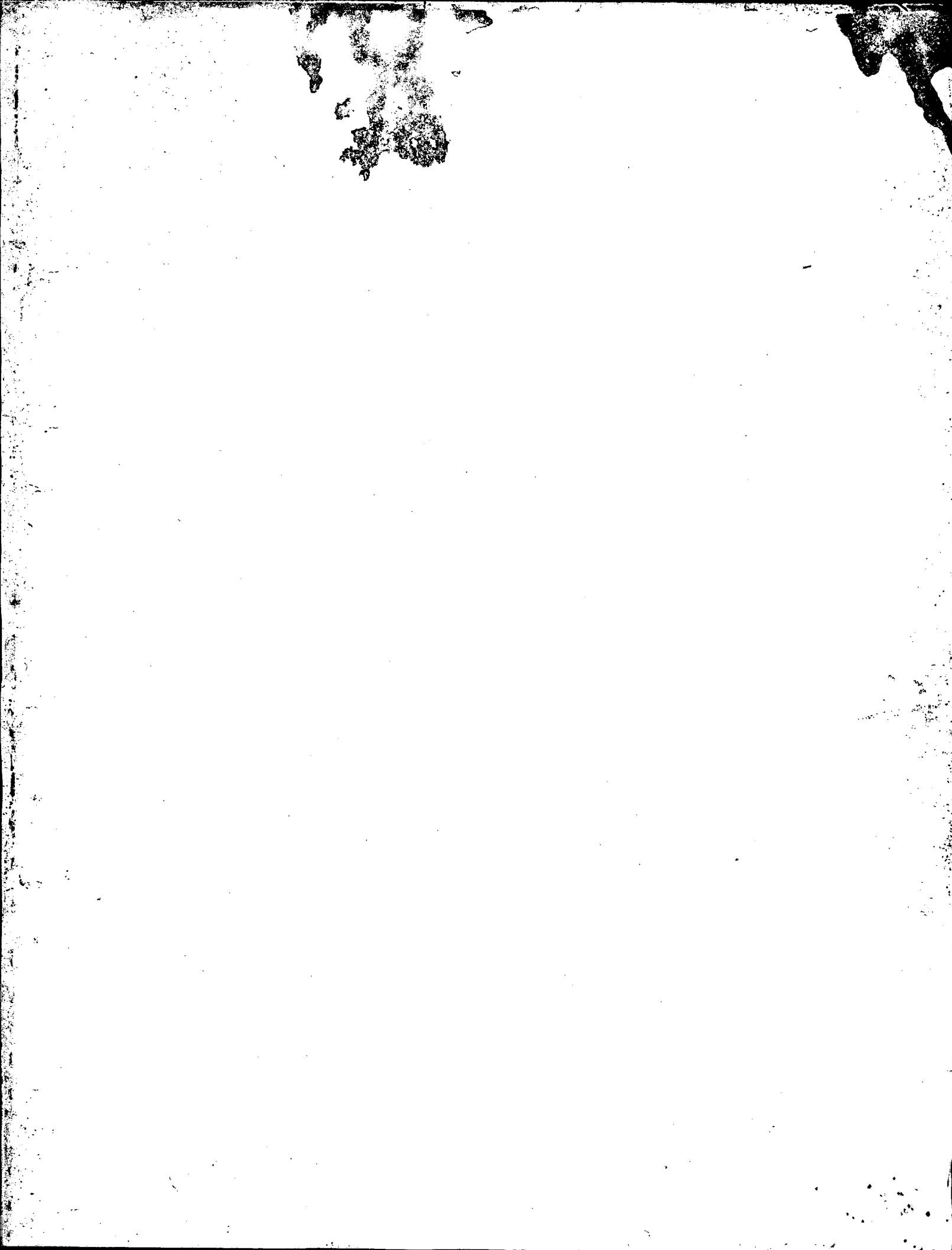
ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVE par / Approved by:



DATE: 2012-05-11

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client./We certify that all the information on this report is exact and in accordance with the order requirements.



**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Jun-12-2012

CONSIGNMENT TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114964
INVOICE #: 60875

**CONTRACT OR
PURCHASE ORDER #** PO17084

DESCRIPTION: CROSSTUBE **QTY** 1

P/N # D350-748-201 **S/N #** 83701

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM-E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

5/17/08/15

CERTIFICATE: I certify that the items indicated hereon have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:





LIQUID PENETRANT TEST REPORT

P- 12188

CLIENT
ATTENTION
PREFERENCE
OBJECT
ITEM(S) EXAMINED

DAT Aerospace
MATT/LINDA
1270 ABERDEEN ST.
HAWKESBURY, ONT

DATE
ACUREN JOB NO.
PO/WO NO.
WORK LOCATION
ACCEPTANCE STD.

JUNE 19/2013 TIME
100-12-20.265 AM PM

17084

SAWE

ASTM 1417/65103E REV./DATE 2005

F.P.I. on cross tubes
SEE RESULTS

(6) Pcs

JOB DESCRIPTION PROCEDURE NO. LT002 REV./DATE 2008 TECHNIQUE NO. LT Tech 2 REV./DATE 2008
PART NO. SEE RESULTS MATERIAL 4130 STEEL THICKNESS Various
SCOPE A WET FLUORESCENT LIQUID PENETRANT EXPLANATION
WAS COMPLETED 100% ON EXTERNAL SURFACE

TEST DETAILS	FLUORESCENT	VISIBLE	WATER WASH	SOLVENT REMOVABLE	POST EMULSIFIED
METHOD	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BLACK LIGHT S/N 16459	OUTPUT > 1000 μW/cm ²	AMBIENT < 2 fc
FAMILY BRAND	MAGNAFLUX		LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT	<input type="checkbox"/> OUTPUT > 100 fc @ SURFACE	
PENETRANT	2667	MINIMUM DWELL TIME 45 ¹⁰ MIN.	OTHER LAB NO		
PENETRANT REMOVER	H ₂ O	MINIMUM DRY TIME >10 MIN.	LIGHT METER S/N 1098866	CAL DUE DATE	JUN 19/2013
DEVE OPER	SKD 52	MINIMUM DWELL TIME 10 MIN.			
DEVE OPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY			
TEST SURFACE			MACHINED	SHOT BLASTED	
SURFACE CONDITION	<input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED		<input type="checkbox"/> 10°C/50°F TO 52°C/125°F		
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/20°F <input type="checkbox"/> -4°C/20°F TO 10°C/50°F		<input type="checkbox"/> > 52°C/125°F		
RESULTS-	<input checked="" type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL				

W.O.#s - CROSS TUBES

83701

83699

83698

81517

81517

84380

M/12.06.19

Scope of Services

The engagement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is understood that descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use devices or data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty is implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

Matthew Murdoch

SIGNATURE

DTR # E 63501

TECHNICIAN (SIGNATURE):

Matthew Murdoch

NAME (PRINT):

CGSB LEVEL 1ST TECHNICIAN
CGSB REG. NO. Caleeb2ND TECHNICIAN
CGSB LEVEL _____ SNT LEVEL _____
CGSB REG. NO. _____REPORT
REVIEWED BY:

NAME

INIT

CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY